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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,185	12/18/2000	Takayuki Araki	P06971US00/L	2588

881 7590 06/16/2003  
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ALEXANDRIA, VA 22314

EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 06/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS 12

# Office Action Summary

Application No.

09/700,185

Applicant(s)

ARAKI ET AL.

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2003.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>11</u> . | 6) <input type="checkbox"/> Other:  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statement filed 3/31/2003 has been placed in the application file, and the information referred to therein has been considered as to the merits.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The rejection of claims 18 and 22-28 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been overcome by the applicant's amendment. New claim 37 is indefinite as it states that segment D has an equiv. weight smaller than that of segment D. As the segments are the same, this statement is not clear. It appears to be a typographical error.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

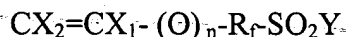
Claims 1, 5, 6, 7, 14, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Masayuki et al. (JP 06-260,184.)

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The amended instant claims are to a material for a solid polyelectrolyte comprising a multi-segmented fluoropolymer having a fluoropolymer chain segments A and B.

Segment A includes a sulfonic acid functional group, which is a copolymer comprising

a) an ethylenic fluoropolymer represented by the formula (1) as claimed:



b) at least one ethylenic fluoropolymer unit with no sulfonic acid functional groups copolymerizable with unit (a).

Segment B includes a fluoropolymer chain that does not include a sulfonic acid functional group and has a crystalline melting point or glass transition point of 100 °C or higher.

Masayuki et al. (JP 06-260,184) teaches a fuel cell with a solid, polyfluorocarbon copolymer electrolyte material. A copolymer of tetrafluoroethylene (or other fluoropolymers as noted in pp. 13) and a monomer of fluoroethylene with a sulfonic acid functional group are shown in claim 3. The monomer includes two ethylenic fluoropolymer units attached by an ether linkage to a sulfonic acid chain (see the examples under Formula 1 in the reference and translated claim 3.) Formula 1 of the reference reads upon Formula 1 of the claims. The fluoropolymers have different equivalent weights based on their structures. The melting point, glass transition values, modulus of elasticity, and equivalent/molecular weights of the materials are inherent to the structure of the monomers and copolymer and are therefore inherent properties of the material. As such, the claims are anticipated.

Claims 1, 5, 6, 7, 14-21, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Harada (US 5,399,184.)

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Harada (US 5,399,184) teaches an electrolyte membrane for a fuel cell comprising a perfluorosulfonic acid-group containing copolymer of tetrafluoroethylene units and perfluorovinyl ether units as shown in claim 1 (formula 1 or 2.) Formula 1 of the reference reads upon Formula 1 of the claims. The monomer includes two ethylenic fluoropolymer units attached by an ether linkage to a sulfonic acid chain. The fluoropolymers have different equivalent weights based on their structures. Specific examples 1-8 and claims 1-10 show average molecular weights and thickness of the materials. The melting point, glass transition values, modulus of elasticity, and equivalent/molecular weights of the materials are inherent to the structure of the monomers and copolymer and are therefore inherent properties of the material.

With regard to claim 17, the reference does not teach the molecular weight of the fluoropolymer chain segment to be from 3000-12,000,000. The reference does teach the molecular weight of the membrane to be from 50,000 to 1,500,000. As the copolymer has two segments that are shown to be about 2.1-7.6:1 (as shown in claim 1), the percentage of weight from the fluoropolymer chain segment will fall into the range from 3000-12,000,000 based on the total weight of the membrane. As such, the claims are anticipated.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-13, 22-40 and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada (US 5,399,184).

Harada (US 5,399,184) teaches an electrolyte membrane for a fuel cell comprising a perfluorosulfonic acid-group containing copolymer of tetrafluoroethylene units and perfluorovinyl ether units as shown in claim 1 (formula 1 or 2.) Formula 1 of the reference reads upon Formula 1 of the claims. The monomer includes two ethylenic fluoropolymer units attached by an ether linkage to a sulfonic acid chain. The fluoropolymers have different equivalent weights based on their structures. Specific examples 1-8 and claims 1-10 show average molecular weights and thickness of the materials.

With regard to claim 30, the reference does not specifically teach the polymer to be a block copolymer. The reference teaches (column 6) that the ion exchange capacity of the membrane can be varied by changing the molar ratio of the tetrafluoroethylene units of the copolymer to the perfluorovinylether monomer with sulfonyl groups. The effects of the ratio and capacities are noted in the discussion. As the artesian has demonstrated an understanding of the effects of the materials, it would be obvious to one of ordinary skill in the art at the time the invention was made to adjust the ratio of materials in the membrane to achieve the desired results noted. One of ordinary skill in the art would recognize that the composition of materials may include block copolymers that would include affect the ratio of segments of material and produce changes in ionic conductivity, electroconductivity and water diffusion based on the ratio of materials. It is further noted that no specifications have been claimed for the blocks that may

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simply include a block of tetrafluoroethylene units followed by a perfluorovinylether monomer with sulfonyl groups.

With regard to claim 8, the reference does not teach varying the relative amounts of monomer in the copolymer to include segments that have different equivalent amounts of the and therefore a different equivalent weight than the copolymer as claimed. The copolymer has two segments that are shown to be in a ratio of in the range of about 2.1-7.6 tetrafluoroethylene units to 1 perfluorovinyl ether unit (as shown in claim 1.) It would be obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of tetrafluoroethylene units per monomer of perfluorovinyl ether unit as it would have an affect on the properties of the membrane as noted in column 6 of the reference. The effects of the ratio and capacities are noted in the discussion. As the artesian has demonstrated an understanding of the effects of the materials, it would be obvious to one of ordinary skill in the art at the time the invention was made to adjust the ratio of materials in the membrane to achieve the desired results noted. One of ordinary skill in the art would recognize that the composition of materials may include block copolymers that would include affect the ratio of segments of material and produce changes in ionic conductivity, electroconductivity and water diffusion based on the ratio of materials.

The artesian would have found the claimed invention to be obvious in light of the teachings of the references:

### ***Response to Arguments***

Applicant's arguments filed 3/31/2003 have been fully considered but they are not persuasive. In light of the amendments, the rejections based on Masayuki et al. (JP 06-260,184)

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and Harada (US 5,399,184) have been overcome for specific claims. The rejections have not been overcome and still apply to claims as 1, 5, 6, 7, 14-21, and 41 as noted in the previous sections. A new rejection has also been presented.

The applicant argues that the references teach a copolymer that only corresponds to segment A of the structure  $CX_2=CX_1-(O)_n-R-SO_2Y$  that is then attached to segment B. The references, however, teach that the membrane is a copolymer that includes a perfluorovinyl ether unit that includes three different  $(-CF_2-CF_2)-$  units attached by ether linkages. Further, the perfluorovinyl ether unit is attached to a group of tetrafluoroethylene units. The structure is equivalent as the tetrafluoroethylene units correspond to both group b and segment B, thus providing the same structure.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,



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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

*Examiner Correspondence*

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 703-305-0587. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:00.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at 703-308-2383.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Mark Ruthkosky

Patent Examiner

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*Mark Ruthkosky*  
6/10/03